MATH 1010: Applied Finite Mathematics
Course Information Sheet and Syllabus
Summer 2018

"Mathematics is the music of reason."
— James Joseph Sylvester

BASIC COURSE DETAILS

Instructor: Dr. Susan Cooper

Class Times and Location: Monday – Friday, 10:45 – 11:45 a.m., EITC E2 160

Tutorial Times and Location: Tuesdays & Thursdays 12:30 – 1:20 p.m.,
TIER 401 (Section B04) & TIER 213 (Section B05)

Credit Hours: 3

Pre-Requisites: None.

Note: MATH 1010 is a terminal course and may not be used as a pre-requisite for other Mathematics courses. This course cannot be used as part of an Honours, Major, General or Minor program in the mathematical sciences. MATH 1010 is not available to any student already holding a grade of "C" or better in any Mathematics course with the exception of MATH 1020, FA 1020, the former MATH 1190 or MATH 1191. MATH 1010 is not to be taken concurrently with any other Mathematics course with the exception of MATH 1020, FA 1020 or MATH 1191.

INSTRUCTOR CONTACT INFORMATION

Instructor: Dr. Susan Cooper

Email: susan.cooper@umanitoba.ca

Office: Machray Hall, Room 464

Office Phone: 204-474-9701

Office Hours: Mondays & Wednesdays 9:15 – 10:15 a.m.; or by appointment

Correspondences and Appointments: The most reliable way to contact me is via email. I will reply to an email within 24 hours of receiving it Mondays – Thursdays; an email received on a Friday or during the weekend will receive a reply the following Monday. All appointments are to be made via email.

COURSE DESCRIPTION AND GOALS

University of Manitoba Course Calendar Description: (Lab required) For students needing to fill the requirement of a university level mathematics course. Introduces students to modern applications of discrete mathematics. Topics include: mathematics of finance, linear programming, graph theory, and game theory.

General Course Description and Goals: One of the great advantages of studying mathematics is that it helps one develop the ability to problem solve and handle abstract ideas. Mathematics in itself is a beautiful language and science that has played a critical role in the creation of our modern world. In this course you will gain familiarity with some mathematical tools and ideas that can be used in a variety of real-world applications. In particular, we will cover the following topics:

- linear equations and inequalities; equations and graphs of lines;

- linear programming models;
- matrices and solving systems of linear equations via row reduction;
- an introduction to graph theory;
- mathematics of finance – simple and compound interest, annuities, loans and mortgages.

Applications will be considered with each topic. By working with concrete examples, you will gain facility and become confident that you can *do* mathematics and you will experience the joy of discovering hidden patterns and mathematical truths.

COURSE MATERIALS

Textbook: *Notes For MATH 1010–Applied Finite Mathematics*, by D. W. Trim & G. L. Moghaddam

Course Web-Page: We will use the instructor's web-page which can be found at

`http://server.math.umanitoba.ca/~coopers5/courses_umanitoba/math1010_summer18.html`

and UM Learn.

Other Resources: Only simple calculators (those with single line display) are permitted for use in this course. Programmable calculators are not permitted, nor or any calculators that can perform matrix operations. Please ensure you are fully aware of your calculators' capabilities as any calculator that can perform these operations being used on any quiz or examination will be confiscated and may result in disciplinary action. No other aids (e.g., translators, cell phones, etc.) are permitted for quizzes and examinations.

ASSESSMENTS AND COURSE GRADES

Suggested Exercises and Readings: Mathematics is not a spectator sport. The best way to learn mathematics is by doing mathematics! A collection of exercises can be found at the end of each section of the textbook. You are highly encouraged to carefully read the textbook and attempt the associated exercises. Although your solutions to these suggested exercises will not be collected for credit, you are highly encouraged and welcome to discuss your solutions with me for feedback either in office hours or before/after class meetings. Note that you should attempt the suggested exercises regularly as the topics are presented – this will help you keep on track and make sure you have solid foundations before moving on to the next topic.

Tutorials and Worksheets: The tutorial sessions are designed to deepen your knowledge of the course material. In every tutorial session for which there is no scheduled quiz or examination, you will be asked to complete a tutorial worksheet. The teaching assistant will be available to answer your questions and help you work through any problems re-emphasizing course content. Worksheets will be collected at the end of the tutorial session. You will earn 5% of your grade by submitting 5 (out of 7 total worksheets assigned) attempted worksheets (not to be corrected); *an indication of serious effort is required for the credit.* Your attendance and active participation is strongly encouraged!

Quizzes: Regular quizzes will be given based on the suggested exercises and tutorial worksheets. The quizzes are intended to gauge your understanding of the material while presenting opportunities for you to practice problem-solving in a timed-setting. Solutions will be graded based on correctness and clarity. Any necessary special grading rules will be provided beforehand. All feedback is meant to *improve* your mathematical abilities and communication. Calculators with single line display only will be allowed and other reference material (e.g., translators, cell phones, etc.) will **not** be allowed on the quizzes. Your lowest quiz score will be dropped from the calculation of your final course grade.

Examinations: There will be one mid-term examination and one 2-hour cumulative final examination. The schedule is:

Examination	Date	Time and Location
Mid-Term Exam	Tuesday, May 29	12:30 – 1:20 p.m., in tutorial session
Final Exam	Friday, June 29	9:00 – 11:00 a.m., Education 224

Calculators with single line display only will be allowed and other reference material (e.g., translators, cell phones, etc.) will **not** be allowed on the mid-term and final examinations. Any necessary special grading rules for the examinations will be announced and discussed prior. In general, solutions to problems will be assessed based on correctness and clarity. Feedback on your solutions will be provided on your mid-term examination and is meant to improve your mathematical abilities and communication. Grades and feedback on your mid-term examination solutions will be provided prior to the Voluntary Withdrawal Deadline.

Deferred Worksheets, Quizzes, and Examinations: There will be *no* deferred tutorial worksheets and quizzes. Note that 5 out of the 7 total worksheets will be used for credit and your lowest quiz score will be dropped for the calculation of your final course grade. Deferred mid-term examinations will only be granted for unavoidable, documented circumstances as described below:

Circumstance	Required documentation
Illness or other medical situation	Official note from clinic, hospital, doctor, nurse, or other health care provider
Military service	Official military activation orders
Funeral or other family emergency	Official documentation from newspaper, funeral, or medical official
Sports or other official U of M activity	Official documentation from U of M athletics or activity's faculty adviser

Students who wish to request a deferred mid-term examination must contact the instructor within 2 days of the scheduled examination (initial email contact is sufficient). Please note that recreational activities do not qualify for deferred examinations. If you have a pre-existing conflict with an assessment, you are expected to make alternative arrangements *beforehand*.

As per university policy, requests for deferred final examinations are made to the student's faculty, school, or academic advising office and must be filed within 48 hours of the date of the missed examination. Full information on this policy can be found at:

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`http://umanitoba.ca/student/records/finals/682.html`

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Class/Tutorial Attendance and Participation: This course covers a large amount of material and may seem very fast-paced. Your understanding of the course material will be greatly supported by regular attendance and engagement in class and tutorial meetings. Although you are expected to attend every class and tutorial meeting and to fully participate in class discussions, attendance will not be taken or be used in the calculation of course grades. However, you are responsible for any missed material when absent. If time permits, we will discuss some of the suggested exercises. In such discussions, students will be asked to share their ideas. Please take your turn in these activities – it will greatly improve your understanding of the material. In particular, if you are absent from class then you will miss the opportunity to learn from your classmates.

Evaluation Scheme: Final course grades will be determined by the following scheme:

Task	Percentage of Grade
Tutorial Worksheets	5%
Quizzes	15%
Mid-Term Examination	30%
Final Examination	50%

Note: A total of 6 quizzes and 7 tutorial worksheets will be administered. Your lowest quiz score will be dropped from the calculation of the quizzes portion of your grade. You will earn 1% of your grade for each submitted worksheet (up to 5%); *a demonstration of serious effort is required to receive credit for a worksheet.*

Letter Grades: The letter grade cut-offs listed below show the minimum cut-off ranges for the course. These cut-offs may change (decrease) at the instructors' discretion.

Letter Grade	Percentage Out Of 100	Final Grade Point Value
A+	93–100	4.5
A	84–92	4.0
B+	78–83	3.5
B	70–77	3.0
C+	65–69	2.5
C	60–64	2.0
D	50–59	1.0
F	Less than 50	0

UNIVERSITY AND DEPARTMENT OF MATHEMATICS SUPPORT OFFICES AND POLICIES

A list (entitled Schedule "A") of supports available to students, including mathematical support, can be found on the course web-page(s).

COURSE SCHEDULE AND IMPORTANT DATES

Below is an *approximate* weekly schedule of topics for our course with section numbering referring to the textbook. Also included are dates for tutorial worksheets, quizzes and examinations. The topics schedule is subject to change at the discretion of the instructor and/or based on learning needs of the students but such changes are subject to Section 2.8 of ROASS (Responsibilities Of Academic Staff With Regard To Students). The assessment dates will not change. *All tutorial worksheets will be administered in the Tuesday tutorial sessions and all quizzes will be administered in the Thursday tutorial sessions.*

DATES	Sections	TOPICS	Worksheet	QUIZ
May 7–11	§1.1–1.3	linear equations in 1 and 2 variables, linear inequalities in 1 variable, straight lines	# 1 May 8	# 1 May 10
May 14–18	§1.4–1.5 §2.1–2.2	linear inequalities in 2 variables, applications of linear equations, linear programming	# 2 May 15	# 2 May 17
No Class: May 21 (Victoria Day)				
May 22–25	§2.2 §3.1–3.3	linear programming and applications, matrices, matrix multiplication, systems of linear equations	# 3 May 22	# 3 May 24
May 28–30	§3.3–3.4	Gaussian elimination, row echelon form		
Mid-Term Examination: Tuesday, May 29 (in tutorial session)				
No Classes: May 31 & June 1				
June 4–8	§3.5–3.7 §4.1	Gauss-Jordan elimination, reduced row echelon form, inverse matrices, intro to graph theory	# 4 June 5	# 4 June 7
June 11–15	§4.2–4.4	properties of graphs, paths and circuits, graphs and adjacency matrices	# 5 June 12	# 5 June 14
Voluntary Withdrawal Deadline: Thursday, June 14				
June 18–22	§4.4–4.5 §5.1–5.3	graphs and adjacency matrices, digraphs, simple interest, compound interest, annuities	# 6 June 19	# 6 June 21
June 25–26	§5.4	loans and mortgages	# 7 June 26	
No Classes: June 27 & 28				
Final Examination: Friday, June 29, 9–11 a.m., Education 224				

EXPECTATIONS

Recording Class Lectures: Susan Cooper and the University of Manitoba hold copyright over the course materials, presentations, and lectures which form part of this course. No audio or video recording of lectures or presentations is allowed in any format (including photographs), openly or surreptitiously, in whole or in part without permission. Course materials (both paper and digital) are for the participant's private study and research.

Using Copyrighted Material: Please respect copyright. We will use copyrighted material in this course. I have ensured that the content I use is appropriately acknowledged and is copied in accordance with copyright laws and University guidelines. Copyrighted works, including those created by me, are made available for private study and research and must not be distributed in any format without permission. Do not upload copyrighted works to a learning management system (such as UM Learn), or any website, unless an exception to the *Copyright Act* applies or written permission has been confirmed. For more information, see the University's Copyright Office web-site at http://umanitoba.ca/copyright/ or contact um_copyright@umanitoba.ca.

Course Technology: It is the University of Manitoba policy that all technology resources are to be used in a responsible, efficient, ethical and legal manner. During class meetings and for course quizzes/examinations/assignments, it is expected that you only use technology for educational purposes and that the only technology used is approved by myself and/or the University of Manitoba Student Accessibility Services. You should not participate in personal direct electronic message/posting activities (such as e-mail, texting, video, social networking, etc.) during scheduled class time – this is not only in your best interests for understanding the course material but is respectful behaviour for your classmates. If you absolutely need to take an expected call, then please use the vibrate mode on your cell phone and leave the classroom before using the phone.

Class Communication: You are required to obtain and use your University of Manitoba email account for all communication between yourself and the university. All communication must comply with the Electronic Communication with Student Policy.

Student Accessibility Services: The University of Manitoba is committed to providing an accessible academic community. *Students Accessibility Services (SAS)* offers academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation. Students are welcome to meet with the instructors to discuss the accommodations recommended by SAS.

Student Accessibility Services
http://umanitoba.ca/student/saa/accessibility/
520 University Centre
Phone: (204) 474–7423
Email: Student_accessibility@umanitoba.ca

Academic Integrity: You are expected to be academically honest. This means, for example, providing a list of the people (if any) with whom you worked and providing a list of sources other than the textbook (if any) that you used to complete an assignment. Although you are encouraged to work together, you should never submit anything that you do not understand or is not written in your own words. The following excerpt about Academic Honesty is taken from the Department of Mathematics web-page:

The Department of Mathematics, the Faculty of Science and the University of Manitoba regard acts of academic dishonesty in quizzes, tests, examinations or assignments as serious offenses and may assess a variety of penalties depending on the nature of the offense. Acts of academic dishonesty include bringing unauthorized materials into a test or exam, copying from another student, plagiarism and examination personation. Students are advised to read the sections entitled "Academic Integrity" and "Examination Personations" in the "General Academic Regulations and Requirements" section of the current Undergraduate Calendar.

Penalties for violation include being assigned a grade of zero on a test or assignment, being assigned a grade of "F" in a course, compulsory withdrawal from a course or program, suspension from a course/program/faculty or even expulsion from the University. For specific details about the nature of penalties that may be assessed upon conviction of an act of academic dishonesty, students are referred to University Policy 1202 (*Student Discipline Bylaw*); and to the Department of Mathematics policy concerning minimum penalties for acts of academic dishonesty.

Students are encouraged to visit the University of Manitoba Academic Integrity site for further information.

Classroom Atmosphere: A part of learning is making mistakes. We want to establish a classroom atmosphere where the inevitable false starts and mistakes become an opportunity to improve – not an opportunity for embarrassment. Please be constructive and polite in questioning your colleagues.

Other Expectations and Tips for Success: I ask that you have a well-defined sense of professionalism, that you always put forth your best effort, and that you develop a sense of responsibility to your educational community. I ask that you exhibit a persistent desire to learn. In return I will provide you with significant support. Also:

- Be positive, open, and responsive to feedback.
- Be an active participant - mathematics is learned by doing; this includes participating fully in classroom activities (please, turn your cell phones off during class), completing the suggested exercises, critically thinking about the mathematics during and outside of class. *In order for this class to be successful, it is imperative that you commit to coming to class/tutorial sessions regularly, that you commit to coming to class/tutorial sessions prepared, and that you commit to participating in class/tutorial sessions!*
- Be/become a "risk taker".
- Be committed.
- Be patient with yourself - it takes time to master newly learned things. Ask for assistance when it is needed. Constantly try to improve yourself as a mathematician.
- Starting with the first class, study in-depth and regularly. This means, for example, that you should do the suggested exercises *before* the next class period.
- It is tempting to just copy available solutions. However, struggling through the exercises on your own is an important phase of the learning process.
- Get help as soon as you need it: ask questions in class and office hours; form a study group with your classmates; consider getting a tutor; use the Math Help Center (located in 412 Machray Hall); use the program LevelUp (see Schedule "A"), etc.
- For examination preparation, practice exercises that have not been assigned.
- Save your solutions to suggested exercises to study from. You may find it helpful to organize your work in a 3-ring binder or notebook for your suggested exercises. You should be able to look at the solutions a month later and understand what is on the paper.
- Mathematics is a language in itself that is common to many sciences across the world. It is crucial that we all use consistent and correct notation. For example, when using the equal sign you should make sure that the quantities on either side of the equal sign are indeed equal.
- Take pride in your work and take your work seriously. This means you should: use complete sentences with proper grammar and correct spelling, write legibly, provide justification for your claims, show all of your work, clearly state all the hypotheses being used, etc.
- Like in all areas of life, constructive feedback can be difficult to digest and accept. Please know that the feedback provided in this course is meant to *improve* your mathematical solutions and communication. Please take the feedback seriously and apply it to your future work.
- Everyone wants you to succeed. Please speak with me regarding any concerns you may have.
- Relax and have fun with the course!